CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION

ORDER 95-013
REVISING ORDER Nos. 86-93 and 87-92

FINAL SITE CLEANUP REQUIREMENTS FOR

FAIRCHILD SEMICONDUCTOR CORPORATION,

NATIONAL SEMICONDUCTOR CORPORATION, AND

STANFORD UNIVERSITY

for the property located at

4001 MIRANDA AVENUE
PALO ALTO
SANTA CLARA COUNTY

The California Regional Water Quality Control Board, San Francisco Bay Region (hereinafter called the Board) finds that:

1. **Site Location and Description** The former Fairchild Semiconductor facility ("the site") is located at 4001 Miranda Avenue in Palo Alto in the northwestern portion of Santa Clara County, California. The site is situated in the southeastern edge of the Stanford Research Park. It is bordered on the south by Miranda Avenue, on the east by Henry Gunn High School, and on the north and west by the Veterans Administration Medical Center complex.

2. The site is about 90 feet above mean sea level (MSL) and is covered with structures and paving. Most of the surrounding area is landscaped or covered with native vegetation. The land surface of the site vicinity is generally flat. Barron Creek bisects the site and intersects with a flood retention pond northeast of the site. The land to the southwest and west of the site is zoned for industrial and research use, and the southeast, east, and north is residential.

3. **Site History and Regulatory Status** Stanford University owns the property located at 4001 Miranda Avenue, Palo Alto. Fairchild Semiconductor ("Fairchild") leased and developed the site in 1961. Fairchild conducted research, design, and support activities to manufacture semiconductor devices until 1987. National Semiconductor Corporation (NSC) acquired Fairchild

Semiconductor Corporation in October 1987. Keenan/Lovewell, a development company, purchased the facility and demolished the old buildings in 1989. Keenan/Lovewell redeveloped the site for an office complex. Spieker Properties, Inc. (development company) currently owns the ground lease, but NSC still conducts remediation at the site.

4. Fairchild used volatile organic compounds (VOCs) such as trichloroethene (TCE), 1,1,1-trichloroethane (TCA), tetrachloroethene (PCE), xylenes, isopropyl alcohol (IPA), acids and bases in its semiconductor manufacturing industry. Fairchild initiated subsurface investigations in 1982, as part of a voluntary environmental assessment for all Fairchild facilities. TCE, PCE and TCA were detected in both soil and groundwater. It discovered a drain pipe for spills from the chemical storage and mixing areas leading to an on-site dry well. Soil and groundwater samples in the vicinity of the dry well revealed significantly high VOC concentrations. Based on the investigation results, the dry well was found to be the source of the contamination.

5. Fairchild is named as a discharger because of its chemical usage history and chemical release to soil and groundwater at the 4001 Miranda Avenue property, during its occupancy of the semiconductor facility. NSC is named as a discharger because it acquired Fairchild including Fairchild's cleanup obligation at the site. Stanford University is named as a discharger because it owns the land. Stanford University (secondarily responsible) will be responsible for compliance only in the event that Fairchild and NSC fail to comply with the requirements of this Order, except for Tasks 4 and 5, for which Stanford is responsible.

   If additional information is submitted indicating that any other parties caused or permitted any waste to be discharged on the site where it entered or could have entered waters of the State, the Board will consider adding that party's name to this Order.

6. **Previous Board Orders** The Board has adopted the following orders and permits for the 4001 Miranda Avenue site:

   - Waste Discharge Requirements Order No. 86-93, adopted December 17, 1986.

   - Cleanup and Abatement Order No. No. 87-92, adopted July 21, 1987.

7. **Hydrogeology** The geology beneath the site consists of two identifiable hydrostratigraphic units: the undifferentiated alluvial sediments and the Santa Clara Formation. These units are composed of laterally discontinuous sand and gravel layers locally separated by less permeable silts and clays. Although reasonable investigation effort was conducted at the site, the water-bearing zones underneath the site still remain undistinguished. The water-bearing zones up to 200 feet below ground surface (bgs) are arbitrarily divided into four zones solely based on depth without any technical rationale. Capture zone analysis is needed to address this issue.

8. The groundwater flow direction in the 0 to 100 foot water-bearing zone is generally to the northeast toward the San Francisco Bay. Groundwater flow in the 100 to 200 foot water-bearing zone is southeast toward irrigation wells at the Alta Mesa Cemetery, located approximately 2,300 feet east of the site. Presently, the aquifers less than or equal to 200 feet bgs beneath the site are not used as drinking water supply.

9. According to previous survey of water wells in the site vicinity area, about 59 private wells were identified. Four private wells were documented as operating within approximately 1,300 feet of the site boundary. The closest private well is approximately 900 feet east of the site and is used for irrigation.

10. **Soil Investigation and Interim Remediation** Fairchild initiated subsurface investigation in 1982. The investigation found a dry well and a drain pipe connecting the chemical mix area and the dry well source of contamination. The floor drains in the chemical mix area were subsequently plugged to prevent further flow of contaminants to the dry well. Fairchild conducted additional soil remedial investigation at the vicinity of the dry well from 1983 to 1989. Investigation results revealed significant VOC concentrations.

11. **Soil Remediation:** Two phases of excavation were conducted at the site. The first phase was conducted in 1985, when about 40 cubic yards of contaminated soil was excavated from the former dry well location. The second phase was conducted in 1989 during demolition of the former buildings for redevelopment. About 1,100 cubic yards of contaminated soil was excavated from the proximity of the former dry well. The excavated area was approximately 35 feet by 24 feet and was about 35 feet deep. Confirmatory soil samples measured about 0.2 ppm of total VOCs at about 34.5 feet bgs. No significant concentrations of VOCs remain in soil on-site, and the soil is not currently considered as a potential source of contamination.

12. Groundwater Investigation and Interim Remediation Groundwater remedial investigation commenced underneath the site in 1982. A total of 43 monitoring wells were installed in the four water-bearing zones and six extraction wells were installed in the two upper water-bearing zones at the site.

13. Fairchild initiated interim remedial measures (IRMs) for contaminated groundwater in 1985. The IRM was implemented to reduce contaminant concentrations and to contain the plume. There are now two "shallow" and three "intermediate" groundwater extraction wells followed by above ground treatment system (air stripper). Two of the extraction wells are near the former dry well and three extraction well are located downgradient of the former dry well area. Extraction well RW-3A was abandoned in June 1994 due to Santa Clara Valley Water District's flood control construction project at the retention pond of Barron Creek. The treated waste-water is discharged to the City of Palo Alto sewage treatment system.

14. Evaluation of Groundwater Interim Remedial Measures The system has reduced contaminant concentrations and appears to contain the plume. However, further reduction of VOC concentrations is needed, especially near the former dry well area. The effectiveness of the existing extraction system needs to be evaluated using pump tests or similar techniques due to the limited understanding of the sites hydrogeology.

15. State Water Resources Control Board Resolutions

State Board Resolution 68-16: On October 28, 1968, the State Board adopted Resolution No. 68-16, "Statement of Policy with Respect to Maintaining High Quality Waters in California." This policy calls for maintaining the existing high quality of State waters unless it is demonstrated that any change would be consistent with the maximum public benefit and not unreasonably affected beneficial uses. This is based on a Legislative finding, contained in Section 13000, California Water Code, which states in part that it is State policy that "waters of the State shall be regulated to attain the highest water quality which is reasonable." The original discharge of wastes to the groundwater at this site was in violation of this policy.

State Board Resolution 88-63: On May 19, 1988, the State Board adopted Resolution 88-63, "Sources of Drinking Water." This resolution states that, with certain exceptions, surface and ground waters of the State are considered

to be suitable, or potentially suitable, for municipal or domestic water supply.

16. Regional Water Quality Control Board Resolutions

Regional Board Resolution 88-160: Resolution 88-160 strongly encourages the maximum feasible reuse of extracted water from groundwater pollution remediations either by the dischargers or other public or private water users. The dischargers obtain a permit to discharge treated groundwater to the City sewage treatment system. Reuse of treated groundwater has not been evaluated at the site.

Regional Board Resolution 89-39: Resolution 89-39, "Incorporation of 'Sources of Drinking Water' Policy into the Water Quality Control Plan" was adopted on March 15, 1989. This policy defines groundwater as suitable or potentially suitable for municipal or domestic supply if it: 1) has a total dissolved solids content of less than 3,000 mg/l, and 2) is capable of providing sufficient water to supply a single well with at least 200 gallons a day.

For purposes of establishing cleanup objectives, the water-bearing zones at this site qualify as potential sources of drinking water.

17. Water Quality Control Plan The Board adopted a revised Water Quality Control Plan for the San Francisco Bay Basin (Basin Plan) on December 17, 1986, and the State Board approved it on May 21, 1987. The Basin Plan contains Water Quality objectives and beneficial uses for South San Francisco Bay and contiguous surface and ground waters.

The existing and potential beneficial uses of the groundwater underlying and adjacent to the facility include:

a. industrial process water supply
b. industrial service water supply
c. municipal and domestic water supply, and
d. agricultural water supply.

The Board amended the Basin Plan on September 16, 1992 (to implement two statewide plans) and again on October 21, 1992 (to formalize groundwater protection and management policies). The latter amendment describes how groundwater cleanup standards should be established. The primary objective is to maintain background, but standards should be set no higher than

maximum contaminant levels (MCLs), and may be set lower based on a site-specific risk assessment. The Board will consider several factors when setting cleanup standards: cost and effectiveness of cleanup alternative, time to achieve cleanup, and pollutants toxicity, mobility, and volume.

18. Summary of Risk Assessment NSC included a risk assessment in the proposed final remedial action plan and its addendum. The risk assessment determined the primary chemicals of interest and their toxicity and identified potential exposure pathways and routes. The assessment computes risks for carcinogenic and non-carcinogenic chemicals in the groundwater, and compares them to the EPA recommended risk range. The assessment assumes a commercial land-use scenario for the on-site and residential land-use scenario for the off-site area. Average groundwater concentration data (1992 and 1993) are used to estimate quantitative exposure. However, NSC in its Remedial Action Plan Addendum (December 28, 1994) evaluated the post-cleanup risk using a more conservative approach, assuming a residential land-use scenario for both on-site and off-site.

Toxicity Classification for Chemicals of Interest: Ten compounds have been consistently detected in the site groundwater. These compounds are chloroform, 1,2-dichlorobenzene (1,2-DCB), 1,1-DCA, 1,2-DCA, 1,1-DCE, cis-1,2-DCE, PCE, 1,1,1-TCA, TCE, and trichlorofluoromethane (Freon 11) and are classified as indicator chemicals.

Four of the indicator chemicals, chloroform, 1,2-DCA, PCE, and TCE are class "B2" carcinogen (with inadequate human evidence and sufficient evidence from animal experiments). 1,1-DCE is a class "C" carcinogen (possible human carcinogen, limited evidence of carcinogenicity in animals with inadequate human data). 1,1-DCB, cis-1,2-DCE, and 1,1,1-TCA are non-carcinogens (Class "D"). Freon 11 and 1,1-DCA are unclassified.

Exposure Assessment: Under current use of the site, there appear to be no complete exposure pathways. The "shallow" and "intermediate" groundwater underneath the site are not currently used, and the deeper groundwater is not affected.

The risk assessment identified two potential exposure pathways. The first hypothetical pathway is the use of groundwater underneath the site as a source of drinking water. Quantification of exposure from this pathway assumes ingestion as an exposure route. The second hypothetical pathway is exposure

to vapor of volatile organic compounds by inhalation exposure route via household use of contaminated groundwater and VOC vapors diffused from contaminated groundwater.

A deed restriction is appropriate to assure that future owners are aware of total petroleum hydrocarbons and volatile organic compound contamination and to prohibit the use of the shallow and intermediate groundwater underneath the site as a source of drinking water until cleanup standards are achieved.

Baseline Public Health Evaluation: For each of the exposure pathways, a total hazard index (HI) and cancer risk for the chemicals of potential concern were developed using average concentration levels from the 1992 and 1993 analytical data. The total HI for the on-site resident (child) was about 2, 0.9 for on-site worker, and about 0.05 for the off-site resident (child). EPA recommends that the total HI for a site not exceed 1.0. The cancer risk for the on-site resident was about 6×10^{-5}, for on-site worker about 3×10^{-5}, and for off-site resident (adult) about 1×10^{-6}. The excess cancer risk lies within the EPA's recommended risk range (1×10^{-4} to 1×10^{-6}).

Post-Cleanup Risk: Quantified public health total risks were determined using the estimated potential chemical intake from the hypothetical drinking water well and inhalation of vapor that were computed utilizing the MCLs as a final cleanup goal for all pollutants of the site. This approach would protect the future beneficial uses of the groundwater underneath the site. For carcinogenic chemical, the excess cancer risk predicted is about 6×10^{-6}; this total includes both the inhalation and ingestion routes. This excess cancer risk level falls within the EPA's recommended risk range (1×10^{-4} to 1×10^{-6}). The total hazard index (HI) for the three indicator chemicals was found to be about 0.4. EPA recommends that the total HI for a site not exceed 1.0.

The risk assessment did not identify soil as an exposure pathway. The potential sources of contaminants in soil have been removed from the former dry well location, and the remaining contaminant concentrations in the unsaturated zone are reduced below cleanup level. Furthermore, the site is entirely either paved or covered by concrete building foundation, precluding potential exposure to soil or vapor. Thus, no complete exposure pathway exists under the current or future site use.

19. <u>Evaluation of Remedial Technologies</u> NSC developed and evaluated a list of possible alternatives for remediating groundwater underneath the site. The

screening of technologies was based on their applicability to site characteristics, on the properties of the chemicals, and on reliability and performance of treatment technologies. Three technologies passed this screening step: (a) vapor extraction and air sparging, (b) *in-situ* bioremediation and (c) continue groundwater extraction and treatment. These remaining technologies, were then further evaluated on the basis of environmental and public health impacts and cost analysis. Final detailed analysis involved implementability, effectiveness, and total project costs. This evaluation followed the approach outlined in EPA's National Contingency Plan (see 40 CFR Part 300).

20. **Remedial Actions** In compliance with the Regional Board's Executive Officer request in a letter dated March 18, 1994, NSC submitted a Remedial Action Plan (RAP) in August 15, 1994. The RAP recommended to continue operating the groundwater extraction and treatment system, discharging treated groundwater to the City of Palo Alto sewage treatment system.

21. **Basis for Cleanup Standards** The groundwater cleanup standards for the site are the more stringent of U. S. EPA or California Department of Health Services primary MCLs (proposed or adopted). At this time, it appears that cleanup of groundwater to background level may be technically impractical due to the site's hydrogeology and the difficulties in restoring aquifers with respect to the physical and chemical properties of the contaminants. Thus, the MCL is acceptable to meet the intent of Resolution 68-16.

22. The dischargers have caused or permitted, and threatens to cause or permit, waste to be discharged or deposited where it is or probably will be discharged to waters of the State and creates or threatens to create a condition of pollution or nuisance.

23. This action is an order to enforce the laws and regulations administered by the Board. This action is categorically exempt from the provisions of the California Environmental Quality Act (CEQA) pursuant to Section 15321 of the Resources Agency Guidelines.

24. Pursuant to Section 13304 of the Water Code, the dischargers are hereby notified that the Board is entitled to, and may seek reimbursement for, all reasonable costs actually incurred by the board to investigate unauthorized discharges of waste and to oversee cleanup of such waste, abatement of the effects thereof, or other remedial action, required by this Order.

25. The Board has notified the dischargers and interested agencies and persons of its intent under California Water Code Section 13304 to prescribe Site Cleanup Requirements for the discharge and has provided them with the opportunity for a public hearing and an opportunity to submit their written views and recommendations.

26. The Board, in a public meeting, heard and considered all comments pertaining to the discharge.

IT IS HEREBY ORDERED, pursuant to Section 13304 of the California Water Code, that the dischargers shall cleanup and abate the effects described in the above findings as follows:

A. **PROHIBITIONS**

1. The discharge of wastes or hazardous materials in a manner which will degrade water quality or adversely affect the beneficial uses of the waters of the State is prohibited.

2. Further significant migration of pollutants through subsurface transport to waters of the State is prohibited.

3. Activities associated with the subsurface investigation and cleanup which will cause significant adverse migration of pollutants are prohibited.

B. **SPECIFICATIONS**

1. The storage, handling, treatment or disposal of soil or groundwater containing pollutants shall not create a nuisance as defined in Section 13050(m) of the California Water Code.

2. Additional characterization of the pollutant plume may be required, should monitoring results show evidence of further plume migration beyond that already identified, or new evidence of soil contamination.

3. Cleanup Standards The following groundwater cleanup standards shall be met at all monitoring wells:

Groundwater Cleanup Standards (ppb)			
Chemical	California Primary MCL	U.S. EPA Primary MCL	Cleanup Standards
Chloroform	--	100	100
1,1-DCB	30	100	30
1,1-DCA	5	--	5
1,2-DCA	0.5	5	0.5
1,1-DCE	6	7	6
cis-1,2-DCE	6	70	6
PCE	5	5	5
1,1,1-TCA	200	200	200
TCE	5	5	5
Freon-11	150	--	150

4. **Future Changes to Cleanup Standards:** If cleanup standards cannot be achieved, the dischargers must demonstrate to the satisfaction of the Board that it is technically impractical from an engineering and/or hydrogeologic perspective and that an alternate proposed level will be protective of human health and the environment. The Board will decide if further final cleanup actions, beyond those completed, shall be implemented at the site.

5. The dischargers shall continue the remedial actions described in Finding 20.

C. PROVISIONS

1. The dischargers shall comply with the attached Self-Monitoring Program.

2. The dischargers shall comply with the Prohibitions and Specifications above immediately except as modified by the time schedule and tasks

listed below.

a. **COMPLETION DATE: AUGUST 31, 1995**

TASK 1: SURVEY OF PRIVATE WELLS: Submit a technical report acceptable to the Executive Officer which provides relevant information on nearby private wells including depth, screening, pumping rates and chemical analysis of the Alta Mesa Cemetery irrigation wells and other private wells, which are within 2,500 feet radius northeast, east and southeast of the site.

b. **TREATED GROUNDWATER REUSE**

1) **COMPLETION DATE: MAY 31, 1995**

TASK 2: REUSE FEASIBILITY: Submit a technical report acceptable to the Executive Officer evaluating the feasibility of reusing treated groundwater. The report shall discuss technical feasibility, cost, regulatory constraints, and potential effects on groundwater remediation. If reuse is feasible, the technical report shall include an implementation schedule.

2) **COMPLETION DATE: According to schedule in Task 2 as approved by Executive Officer**

TASK 3: IMPLEMENTATION: Submit a technical report acceptable to the Executive Officer documenting that any proposed and approved treated groundwater reuse has been implemented.

c. **INSTITUTIONAL CONSTRAINTS**

1) **COMPLETION DATE: APRIL 30, 1995**

TASK 4: PROPOSED CONSTRAINTS: Submit a technical report acceptable to the Executive Officer documenting procedures to Implement a deed restriction for the 4001 miranda avenue property to be prepared and filed by Stanford (the owner) prohibiting the use of on-site groundwater from the upper 200 feet bgs aquifers as a source of drinking water. Constraints shall remain in effect until groundwater cleanup standards have been achieved and pollutant levels have

stabilized in aquifers underneath the site. The Executive Officer may approve an alternative mechanism if it accomplishes the same function as a deed restriction.

2) **COMPLETION DATE: 60 days after Executive Officer approval of Task 4**

TASK 5: IMPLEMENT CONSTRAINTS: Submit a technical report acceptable to the Executive Officer documenting that a deed restriction or alternative approved constraints have been implemented.

d. 1) **COMPLETION DATE: JUNE 15, 1995**

TASK 6: CAPTURE ZONE EVALUATION OF THE EXTRACTION WELLS: Submit a technical report acceptable to the Executive Officer that demonstrates the effectiveness of the existing extraction wells for the purpose of hydraulically controlling contaminant migration, using pump tests or similar techniques. If additional lateral or vertical plume containment or contaminant concentration reduction is required, the technical report shall include an implementation schedule.

2) **COMPLETION DATE: According to schedule in Task 6 as approved by Executive Officer**

TASK 7: IMPLEMENTATION Submit a technical report acceptable to the Executive Officer documenting that any additional groundwater remediation has been implemented.

e. **COMPLETION DATE: JANUARY 31, 2001**

TASK 8: FIVE-YEAR STATUS REPORT AND EFFECTIVENESS EVALUATION: Submit a technical report acceptable to the Executive Officer containing the results of any additional investigation; an evaluation of the effectiveness of installed final cleanup measures and cleanup costs; additional recommended measures to achieve final cleanup objectives and standards, if necessary; a comparison of previous expected costs with the costs incurred and projected costs necessary to achieve cleanup objectives and standards; and the tasks and time schedule necessary to implement any additional final cleanup measures. This report shall also describe the reuse of extracted groundwater and

evaluate and document the cleanup of contaminated groundwater. If cleanup standards in this Order have not been achieved on-site and are not expected to be achieved through continued groundwater extraction and/or soil remediation, this report shall also contain an evaluation addressing whether it is technically practicable to achieve the cleanup standards, and if so, a proposal for procedures to do so.

f. **COMPLETION DATE:** **90 days after request made by the Executive Officer**

TASK 9: EVALUATION OF NEW HEALTH CRITERIA: Submit a technical report acceptable to the Executive Officer which contains an evaluation of how the final plan and cleanup standards would be affected, if the concentrations as listed in Specification B.3. changes as a result of promulgation of drinking water standards, maximum contaminant levels or action levels or other health based criteria.

g. **COMPLETION DATE:** **90 days after request made by the Executive Officer**

TASK 10: EVALUATION OF NEW TECHNICAL INFORMATION: Submit a technical report acceptable to the Executive Officer that documents an evaluation of new technical and economic information which indicates that cleanup standards or cleanup technologies in some areas may be considered for revision. Such technical reports shall not be required unless the Executive Officer or the Board determines that such new information indicates a reasonable possibility that the Order may need to be changed under the criteria described in Finding 20.

h. **CURTAILMENT OF REMEDIATION**

1) **COMPLETION DATE:** **90 days prior to proposed curtailment**

TASK 10: CURTAILMENT CRITERIA AND PROPOSAL: Submit a technical report acceptable to the Executive Officer containing a proposal to curtail pumping from any groundwater extraction well and the criteria used to justify such curtailment. Curtailment of groundwater extraction may include, but is not limited to: final shutdown of the system, a

phased approach to shutdown, pulsed pumping, or a significant change in pumping rates. The report shall include the rationale for curtailing or modifying the system. The report for final shutdown of the system shall include data to show that groundwater cleanup standards for all volatile organic compounds have been achieved and pollutant levels have stabilized or are stabilizing, and that the potential for pollutant levels rising above cleanup standards is minimal.

If the proposal is substantive curtailment of groundwater extraction, it is subject to approval by the Board. Otherwise, it is subject to approval by the Executive Officer.

If the dischargers claim that it is not feasible to achieve cleanup standards, the report shall evaluate the alternate standards that can be achieved, and that the alternative cleanup standards proposed will be protective of human health and the environment.

2) **COMPLETION DATE:** **60 days after Board or Executive Officer approves curtailment**

TASK 11: IMPLEMENTATION OF CURTAILMENT: Submit a technical report acceptable to the Executive Officer documenting completion of the necessary tasks identified in the technical report submitted for Task 10.

3. The submittal of technical reports evaluating interim and final remedial measures will include a projection of the cost, effectiveness, benefits, and impact on public health, welfare, and environment with the guidance provided by Subpart F of the NCP (40 CFR Part 300); Section 25356.1(c) of the California Health and Safety Code; CERCLA guidance documents; and shall be consistent with the State Water Resources Control Board's Resolution No. 68-16, "Statement of Policy with Respect to Maintaining High Quality of Waters in California."

4. If the dischargers are delayed, interrupted or prevented from meeting one or more of the completion dates specified in this order, the dischargers shall promptly notify the Executive Officer, and the Board may consider revision to this Order for such delays that are beyond the control of the dischargers.

5. Technical status reports on compliance with the Prohibitions,

Specifications, and Provisions of this Order shall be submitted semi-annually to the Board commencing on January 31, 1995, and covering the previous two calendar quarters. After one year, these reports may then be submitted annually or as required by the Executive Officer. These reports shall consist of: (1) a summary of work completed since submittal of the previous report and work projected to be completed by the time of the next report, (2) obstacles identified which may threaten compliance with the schedule of this Order and what actions are being taken to overcome these obstacles, and (3) include, in the event of non-compliance with any Provision of Specification of this Order, written notification which clarifies the reasons for non-compliance and which proposes specific measures and a schedule to achieve compliance. This written notification shall identify work not completed that was projected for completion, and shall identify the impact of non-compliance on achieving compliance with the remaining requirements of this Order.

These reports shall also identify any problems with or changes in the groundwater extraction and treatment system. Additionally, the reports shall include, but not be limited to, updated water table and piezometric surface maps and plume maps for all affected water-bearing zones, and appropriately scaled and detailed base maps showing the location of all monitoring wells and identifying adjacent facilities and structures. These reports may be combined with self-monitoring reports required pursuant to Provision C.1.

6. On an annual basis beginning with the report due January 31, 1995, or as required by the Executive Officer, the status report shall include an evaluation of the progress of cleanup measures such as hydraulic control of the plume, performance of the remedy, estimation of capture zones influenced by the groundwater extraction wells, establishment cone of depression using field data, and a summary of soil and water quality data. The report shall also evaluate the effects of operation of existing extraction wells on groundwater levels and an estimate of the amount of chemicals removed via the groundwater extraction system. These reports may be combined with self-monitoring reports required in Provision C.1. No such report needs to be filed in the year 2001.

7. The dischargers shall submit technical reports acceptable to the Executive Officer containing revised Quality Assurance Project Plans, Site Safety Plans, and Site Sampling Plans, if requested by the Executive

Officer.

8. All hydrogeological plans, specification, reports, and documents shall be signed by or stamped with the seal of a registered geologist, engineering geologist, or professional engineer.

9. All samples shall be analyzed by State certified laboratories or laboratories accepted by the Board using approved EPA methods for the type of analysis to be performed. All laboratories shall maintain quality assurance/quality control records for Board review.

10. The dischargers shall maintain in good working order, and operate, as efficiently as possible, any facility or control system installed to achieve compliance with the requirements of this Order.

11. The dischargers shall provide copies of all correspondence, reports, and documents pertaining to compliance with the Prohibitions, Specifications, and Provisions of this Order to the Santa Clara Valley Water District. The dischargers shall also provide copies of cover letters, title page, table of contents and the executive summaries of compliance report to the following agencies.

    a. Santa Clara County Department of Environmental Health
    b. City of Palo Alto Planning Department
    c. California EPA/DTSC Site Mitigation Branch

12. The dischargers shall permit the Board or its authorized representative, in accordance with Section 13267(c) of the California Water Code:

    a. Entry upon premises in which any pollution sources exist, or may potentially exist, or in which any required records are kept, which are relevant to this Order.

    b. Access to copy any records required to be kept under the terms and conditions of this Order.

    c. Inspection of any monitoring equipment or methodology implemented in response to this Order.

    d. Sampling of any groundwater or soil which is accessible, or may

become accessible, as part of any investigation or remedial action program undertaken by the dischargers.

13. If any hazardous substance is discharged in or on any waters of the State, or discharged and deposited where it is, or probably will be discharged in or on any water of the State, the dischargers shall report such discharge to this Board, at (510) 286-1255 on weekdays during office hours from 8:00 a.m. to 5:00 p.m., and to the Office of Emergency Services at (800) 852-7550 during non-office hours. A written report shall be filed with the Board within five working days and shall contain information relative to: the nature of the waste or pollutant, quantity involved, duration of incident, cause of spill, estimated size of affected area, nature of effects, corrective measures that have been taken or planned, and scheduled of these activities, and persons, notified.

14. The dischargers shall file a report on any changes in site occupancy and ownership associated with the facility described in this Order.

15. The Board will review this Order periodically and may revise the requirements when necessary.

16. **COST REIMBURSEMENT:** The dischargers shall be liable, pursuant to Section 13304 of the Water Code, to the Board for all reasonable costs actually incurred by the Board to investigate unauthorized discharges of waste and to oversee cleanup of such waste, abatement of the effects thereof, or other remedial action, required by this order. If the site addressed by this Order is enrolled in a State Board-managed reimbursement program, reimbursement shall be made pursuant to this Order and according to procedures established in that program. Any disputes raised by the dischargers over the reimbursement amounts or methods used in that program shall be consistent with the dispute resolution procedures of that program.

17. Board Order Nos. 86-93 and 87-92 are hereby rescinded.

I, Steven R. Ritchie, Executive Officer, do hereby certify that the foregoing is a full, true and correct copy of an Order adopted by the California Regional Water Quality Control Board, San Francisco Bay Region, on January 18, 1995.

Steven R. Ritchie
Executive Officer

Attachments: Groundwater Self-Monitoring Program

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION

GROUNDWATER SELF-MONITORING PROGRAM

FOR

NATIONAL SEMICONDUCTOR

4001 MIRANDA AVENUE

PALO ALTO, Santa Clara County

ORDER NO. 95-013

Adopted on January 18, 1995

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION

National Semiconductor
4001 Miranda Avenue Site

GROUNDWATER SELF-MONITORING PROGRAM

A. GENERAL

Reporting responsibilities of waste dischargers are specified in Sections 13225(a), 13267(b), 13283, 13383 and 13387(b) of the California Water Code and this Regional Board's Resolution No. 73-16.

The principal purposes of a monitoring program by a waste discharger, also referred to as self-monitoring program (SMP), are: (1) to document compliance with waste discharge requirements and prohibitions established by this Regional Board, (2) to facilitate self-policing by the waste discharger in the prevention and abatement of pollution arising from waste discharge, (3) to develop or assist in the development of effluent or other limitations, discharge prohibitions, national standards of performance, pretreatment and toxicity standards, and other standards, and (4) to prepare water and waste water quality inventories.

B. SAMPLING AND ANALYTICAL METHODS

Sample collection, storage, and analyses shall be performed according to the EPA Method 8000 series in "Test Methods for Evaluating Solid Wastes, Physical/Chemical Methods," dated November 1986; or other methods approved and specified by the Executive Officer of this Regional Board.

C. REPORTS TO BE FILED WITH THE REGIONAL BOARD

1. Violation of Requirements

In the event the discharger is unable to comply with the conditions of the site cleanup requirements and prohibitions due to:

a. maintenance work, power failures, or breakdown of waste treatment equipment, or

b. accidents caused by human error or negligence, or

c. other causes, such as acts of nature, or

d. poor operation or inadequate system design,

the discharger shall notify the Regional Board office by telephone as soon as he or his agents have knowledge of the incident and confirm this notification in writing within five working days of the telephone notification. The written report shall include time, date, and person notified of the incident. The report shall include pertinent information explaining reasons for the non-compliance and shall indicate what steps were taken to prevent the problem from recurring.

2. The discharger shall file a written technical report to be received at least 30 days prior to advertising for bid (or 60 days prior to construction) on any construction project which would cause or aggravate the discharge of waste in violation of requirements; said report shall describe the nature, cost, and scheduling of all action necessary to preclude such discharge.

3. Self-Monitoring Reports (SMR)

SMRs shall be filed semi-annually and are due one month after the end of the second and fourth calendar quarters. The next SMR is due January 31, 1995.

The discharger shall notify Regional Board staff by telephone within fourteen days of receiving laboratory analytical results if (i) a chemical is detected which has not been detected previously, or (ii) if the concentration of any chemical in any well is at least one order of magnitude greater than detected the previous monitoring period.

The SMR shall be comprised of the following:

a. Letter of Transmittal:

A letter from the discharger transmitting the SMR should accompany each report. Such a letter shall include a discussion of requirement violations found during the reporting period and actions taken or planned for correcting any requirement violations. If the discharger has previously submitted a detailed time schedule for correcting requirement violations, a reference to this correspondence will be satisfactory. Monitoring reports and the letter transmitting reports shall be signed by a Principal Executive Officer or a duly authorized representative of that person.

The letter shall contain a statement by the official, under penalty of perjury, that to the best of the signer's knowledge the report is true and correct.

b. Results of Analyses and Observations

(1) Results from each required analysis and observation shall be submitted in the self-monitoring regular reports. Results shall also be submitted for any additional analyses performed by the dischargers at the specific request of the Board. Semi-annually water level data shall also be submitted in the report.

(2) The SMR shall include the groundwater extraction rates from each extraction well, water level data from the extraction wells, the results of any aquifer tests conducted.

(3) The SMR shall include a discussion of unexpected operational changes which could affect performance of the extraction and treatment system, such as groundwater velocity and gradient fluctuations and maintenance shutdown.

(4) The SMR shall also identify the analytical procedures used for analyses either directly in the report or by reference to a standard plan accepted by the Executive Officer. Any special methods shall be identified and should have prior approval of the Board's Executive Officer.

(5) The discharger shall describe in the SMR the reasons for significant increases in a pollutant concentration at a well. The description shall include:

(a) the source of the increase,

(b) how the discharger determined or will investigate the source of the increase, and

(c) what source removal measures have been completed or will be proposed.

(6) Original lab results shall be retained and shall be made available for inspection for six years after origination or until after all continuing or impending legal or administrative actions are resolved.

(7) The SMR shall include a summary of work completed since submittal of the previous report, design specifications if applicable, and work projected to be completed by the time of the next report.

(8) The SMR shall include tabulated results of self-monitoring water quality sampling analyses for all wells using appropriate analytical methods. The annual report shall include updated isoconcentration maps of VOCs in groundwater.

(9) The SMR shall include updated water table and piezometric surface maps, based on the most recent water level measurements for all affected water-bearing zones for all on-site and off-site wells. Interpretations of the data shall be discussed.

(10) A map or maps shall accompany the SMR showing all sampling locations and plume contours for the predominant chemical(s), or other indicator chemicals upon request by the Executive Officer.

(11) The annual report may be combined with the fourth quarter regular report and shall include cumulative data for current year. The annual report for January 31, 1995, shall also include minimum, maximum, median, and average water quality data for the year, and a summary of water level data and GC/MS results. The report shall contain both tabular and graphical summaries of historical monitoring data.

4. SMP Revisions

Additional long term or temporary changes in the sample collection frequency and routine chemical analysis may become warranted as monitoring needs change. These changes shall be based on the

following criteria and shall be proposed in a SMR. The changes shall be implemented no earlier than 45 days after the SMR is submitted for review unless approved in writing.

Criteria for SMP revision:

(1) Discontinued analysis for a routine chemical parameter for a specific well after a two-year period of below detection limit values for that parameter

(2) Changes in sampling frequency for a specific well after a two-year period of below detection limit values for all chemical parameters from that well

(3) Temporary increases in sampling frequency or changes in requested chemical parameters for a well or group of wells because of a change in data needs (e.g. groundwater extraction effectiveness or other remediation strategies)

(4) Add routine analysis for a chemical parameter if the parameter appears as an additional chromatographic peak in three consecutive samples from a particular well

(5) Alter sampling frequency based on evaluation of collective data base

D. DESCRIPTION OF SAMPLING STATIONS

See Table 1 for monitoring wells installed at the time of the adoption of this SMP.

E. SCHEDULE OF SAMPLING AND ANALYSES

1. All wells at the site shall be sampled according to the schedule in Table 1.

2. If a previously undetected compound or peak is detected in a sample from a well, a second sample shall be taken within a week after the results from the first sample are available. All chromatographic peaks detected in two consecutive samples shall be identified and quantified in

the SMR.

3. Groundwater elevations shall be obtained semi-annually from all wells at the site and submitted in the self-monitoring report with the sampling results.

4. Well depths shall be determined on an annual basis and compared to the depth of the well as constructed. If greater than ninety percent of screen is covered, the discharger shall clear the screen by the next sampling.

I, Steven R. Ritchie, Executive Officer, hereby certify that the foregoing self-monitoring Program:

1. Has been developed in accordance with the procedure set forth in this Regional Board's Resolution No. 73-16 in order to obtain data and document compliance with site cleanup requirements established in Regional Board Order No. 95-013.

2. May be reviewed at any time subsequent to the effective date upon written notice from the Executive Officer or request from the discharger, and revisions will be ordered by the Executive Officer or Regional Board.

3. Was adopted by the Board on January 18, 1995.

1/18/95
Date

Steven R. Ritchie
Executive Officer

Attachments: Table 1 - Monitoring Schedule

Table 1
Groundwater Monitoring Schedule for
4001 Miranda Avenue Site

Monitoring Well Location	Sampling Frequency
0- to 50-Foot Interval	
RW-2A*	Semi-annually
RW-4A*	"
2A	Annually
4	"
5	"
6	"
8	"
12	"
20	"
28	"
62	"
50- to 100-Foot Interval	
RW-2B*	Semi-annually
RW-4B*	"
30B*	"
21	"
63	"
15	Annually

Monitoring Well Location	Sampling Frequency
50- to 100-Foot Interval	
22	Annually
23	"
27	"
29	"
36	"
64	"
100- to 150-Foot Interval	
34	Annually
42	"
47	"
65	"
67	"
150- to 200-Foot Interval	
46	Annually
53	"
68	"

Note:

1. *For semi-annual monitoring, water samples should be analyzed for volatile organic compounds, using EPA Methods 8010.*
2. *For annual monitoring, water samples should be analyzed for volatile organic compounds, using EPA Methods 8240.*

* *Extraction wells*